ORIGINAL ARTICLE

Bone Age Assessment from Pelvic Bones in Southern Punjab Population. An experience in Sheikh Zayed Medical College Rahim Yar Khan

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ABSTRACT

Background: As accurate birth data is not available, especially in rural population, bone age assessment is required. Bone age estimation is also required in criminal and civil law suits, childhood marriages and competitive sports.

Objective: To detect variation in the appearance of epiphyseal centers of iliac crest and ischealtubersosity in evaluation of bone age in children of Southern Punjab, having chronological age between13--15 years and results are compared with various previous studies.

Study Design: Prospective study.

Setting: Radiology Department, Sheikh Zayed Medical College Rahim Yar Khan.

Duration of Study: Jan 2019 to May 2020

Results: Out of 100 patients, 50 were males and 50 were females. Epiphysis of iliac crest and ischeal tuberosity are found to be appeared in majority of children, especially at the age of 14 and 15-year of age.

Conclusion: In Southern Punjab, epiphyseal centers of iliac crest and ischeal tuberosity appear early in children of 14 and 15 years. Bone age calculation by using Pareech's table significantly underestimates chronological age in Pakistani children between the ages of 14 and 15 years.

Key Words: X-Rays, Bone age assessment, Epiphyseal center, Iliac crest, Ischeal Tuberosity.

INTRODUCTION

The bone age demonstrates level of structural maturity of children[1]. This may be different from chronological age, which is calculated using the date of birth of an individual. Estimation of bone age is required where accurate birth records are not available. Birth data is absent especially in rural population in our country, especially due to illitracy[2]. Another important reason for bone age estimation is social cheating. Cheating is common in our country regarding age registration while child is admitted in the school. Parents usually register less age of their children, keeping in view to overcome problems of over age while getting job in future after studies. Bone age is also requested by pediatricians and endocrinologists for comparison with chronological age for diagnosing diseases which result in tall or short stature in children. Accurate estimation of bone age is also needed in conditions such as in law suits, childhood or adolescent marriages and in competitive sports[2].

Radiography of the hand & wrist is the commonest modality used to calculate bone age. X-Rays of elbow, shoulder and pelvis are also helpful for precise evaluation of age. The most common methods of skeletal maturity assessment include the Greulich and Pyle[4] methods and Tanner and Whitehouse II (TW2)[5] and.

In our study we assessed skeletal age by observing the epiphysis of iliac crest and ischeal tuberosity of adolescent boys and girls and our results are compared with standards forensic books like Pareekh and Siddique Hussain for establishment their practical application and reliability especially in southern Punjab population.

PATIENTS AND METHODS

Study is conducted in Radiology Department at Sheikh Zayed Medical College Rahim Yar Khan from January 2019 to May 2020. Ethical clearance was obtained from the ethical committee of SZMC and proper consent was obtained from the study participants. All children between the ages of 13--15 years of both sexes were included in this study.

Children were referred from NADRA, civil and criminal courts and pediatric department for bone age assessment. We analyzed patient demographics and chronological age. A series of 100 patients having chronological age of 13—15 years were included in this study.

Image Acquisition: Digital X-Rays of pelvis were acquired of every child.

RESULTS

A total of 100 children between the ages of 13—15 years were selected for this study. Among 100 children 50 (50 %) were males and 50 (50 %) were females.

Demographic information about male and female patients is given below:

	13 Years	13—14 Years	14—15 Years	Total
Male	16	20	14	50
Female	12	28	10	50

Our results show that in male children epiphysis of iliac crest have appeared in 06 children at the age of 13

years, 12 children at the age between 13—14 years and in 11 children upto the age of 15 years. In case of female children epiphysis of iliac crest has appeared in 03 at the age of 13 years, 13 children at the age between 13—14 years and in 05 children upto the age of 15 years (table-1). In case of female children epiphysis of iliac crest has appeared in 03 children at the age of 13 years, 13 children at the age between 13—14 years and in 05 children upto the age of 15 years (table-2). Regarding of Ischeal Tuberosity in male children no epiphysis has appeared at the age of 13 years, 08 children at the age between 13—14 years and in 06 children upto the age of 15 years (table-1). In female children epiphysis has appeared in 07 children at the age of 13 years, 18 children at the age between 13—14 years and in 07 children upto the age of 15 years (table-2). Thus, this study demonstrates that in Southern Punjab epiphysis of iliac crest and ischeal tuberosity appear earlier as compared to other parts of subcontinent.

Table-1: Male Children

Chronological Age	Epiphysis of Iliac Crest		Epiphysis of Ischeal Tuberosity	
	Epiphysis Appeared	Epiphysis Not Appeared	Epiphysis Appeared	Epiphysis Not Appeared
13 Years	06	10	---	16
13—14 Years	12	08	08	12
14—15 Years	11	03	06	08
Total	29	21	14	36

Table-2: Female Children

Chronological Age	Epiphysis of Iliac Crest		Epiphysis of Ischeal Tuberosity	
	Epiphysis Appeared	Epiphysis Not Appeared	Epiphysis Appeared	Epiphysis Not Appeared
13 Years	03	09	07	05
13—14 Years	13	15	18	10
14—15 Years	05	05	07	03
Total	21	29	32	18

DISCUSSION

Our study indicates that there is a great variation in appearance of epiphysis of iliac crest in adolescents of southern Punjab observed during bone age calculation. There is a paucity of literature from Pakistan regarding bone age assessment in children.

A study done by Chowdhuri S, Bhattacharjee R and et al[6] concludes that a significant correlation was found between the age and grade of ossification. They divided the appearance of iliac crest epiphysis into stages: Grade1: ossification center has not yet ossified. Grade 2: ossification center has ossified but epiphyseal cartilage has not ossified. Grade 3: epiphyseal cartilage has partially ossified. Grade 4: epiphyseal cartilage has completely ossified. They found that ossification center of iliac crest appear within the age bracket of 14—17 years. Another study done by Siddiqi H, Nisar S, Waheed N[7] demonstrated that earliest appearance of epiphysis center of ischeal tuberosity occurred at 12—13 years in male and 10—11 years in females, while the latest appearance was observed at the age of 21—22 years in females and 22—23 years in male. The complete union of centre of ossification was observed earliest at the age of 19—20 years in females and 16—17 years in males. In another study done by Bhise S S and Nanandkar S D[8], results demonstrated that epiphysis of crest of ilium appeared at 15—16 years in males and 14—16 years in females and epiphysis of ischeal tuberosity appeared at 16—17 years in males and 15—17 years in females. Epiphysis of crest of ilium fused in most of the cases at 21—22 years for males and at 20—21 years for females and ischeal tuberosity fuses at 21—22 years in both sexes. Various international studies have reported different results regarding the estimation of chronological age.

CONCLUSION

From this study, it can be concluded that epiphyseal appearance of iliac crest and ischeal tuberosity can be used for forensic age diagnosis in adolescent children. In Southern Punjab, epiphyseal centers of iliac crest and ischeal tuberosity appear early in children of 14 and 15 years of age as compared to standard tables in common use. However, examination of pelvic bones cannot be used as sole parameter for age determination and must be correlated with other age determining parameters.

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